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DEPARTMENT OF GENETICS
School of Medicine

November 21, 1960

Dr. Raymond Latarjet
Institute du Radium
26 Rue d'Ulm
Paris 5, France

Dear Raymond:

During the next few years, the National Aeronautics and Space Agency in this country will be intensifying its program of scientific studies of space exploration in relation to biology. My own interest in this is primarily with regard to the possibility of the independent evolution of life on other planets; however, I have also found it necessary to be available for advise on other aspects of the research programming in this area.

One of these aspects is the empirical calibration of the biological effects of penetrating radiations. Perhaps the principal motivation for these studies is to lay the groundwork for the eventual exploration of the solar system by manned vehicles but it is also possible that more fundamental scientific objectives can also be achieved. For my own part, I had felt that the physical measurement of these radiations would probably constitute the whole story but there can be no doubt of the validity of the argument that it is also necessary to make direct measurements of biological effectiveness on suitable sample organisms. In fact, there have been some recent results, of which I do not know the experimental details, which might suggest that there are some interactions between other parameters in the space craft environment and the radiation effects and so long as this possibility remains unchecked it will, of course, be necessary to do careful experiments with the best available material.

Until recently, such experimentation had to be designed in the very difficult context of setting up an automatic experiment whose results would have to be radioed back to the terrestrial laboratory. However, more recently the successful recovery of capsules from satellites opens the way to a simpler and therefore much broader approach to biological investigation.

As I have already discussed with Marcovich and I think also with you, I think there is little doubt that Escherichia coli K-12 would be one of the most appropriate biological test objects, especially from the standpoint of

calibrating the extent of lysogenic induction. I am writing now to ask whether you, with Marcovich, would be interested in the opportunity to cooperate in such experiments. While I cannot speak in an official way for the NASA I have every reason to believe that an expression of interest on your part could be followed by constructive arrangements to fly samples furnished by you on a variety of rocket and orbital flights during the next few years. In view of your pioneering work in this sensitive radiobiological system, and since I knew that you were already interested in using it for the calibration of cosmic radiation, it seems to me most appropriate to try to arrange to give you a first option in pursuing these experiments. If you are interested, please let me know, or if you would prefer, communicate directly with Dr. Young whose address appears at the foot of this letter. If I can be of any assistance as a local intermediary either in the preliminary arrangements or in the management of samples, please let me know. However, I would hope that you would undertake to prepare the samples, measure the controls, and make the measurements on the exposed samples. Facilities will also be available for the exposure of similar samples to simulated environments on the ground if the flight samples should give any interesting result.

The range of expected exposures on various flights would be of the order of 1-100 R which should, in any case, be within the range of detection of the K-12 system. Even the result of a good agreement between the physical and biological measures of cosmic and van Allen belt radiation would be an important result in helping to clear up some potential confusion; there is of course, also the possibility of an unexpected deviation.

Needless to say, I would not urge this project on you if I did not believe that it could be conducted in an entirely open way without any form of security restriction. The only constraint of which I am aware at the present time is the policy against advance publicity of the dates of specific experiments since these dates are dependent on operational factors.

If you are planning to come to this country during the next few months, it could furnish an opportunity to discuss the matter further; in any case, we would be very happy to see you at Stanford. On the other hand, there are current tentative plans to hold a meeting of the International Committee for Space Research (COSPAR) in Italy in mid-April and this might also afford a convenient opportunity. (Since the arrangements for this meeting have not yet been completed, the date and place should not be publicized.)

According to newspaper accounts, the Russians must already be planning some very similar experiments in their own flight - at least I have seen a specific reference to E. coli K-12 as one of the passengers in their last "cosmic spaceship." I have no idea who would be involved in this experiment or, in fact, who would be likely to have the appropriate orientation to be doing it.

With best regards,

Joshua Lederberg
Professor of Genetics

cc: Dr. Richard Young
National Aeronautics and
Space Administration
1520 H Street, N.W.
Washington 25, D.C.

P.S. I would assume that any arrangements you made with NASA to cooperate on these experiments could include some provision for your specific expenses in doing them. As far as I know, these arrangements would be handled on a personal scientific, rather than a diplomatic inter-governmental basis but this may be as much a matter of French as of U.S. policy and you may know or learn more about it than I do. If it would help to simplify the program, I would be glad to act as nominal investigator though I would like it even better if I did not have to be involved.

I am enclosing a paper you may already have seen that says some more about the area of my own special interest in space exploration.

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P.S. - see also a review of current status by Newell and Naugle in Science for Nov. 18.